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SPECIAL REPORT

OF THE

MASSACHUSETTS BAY

TRANSPORTATION AUTHORITY

AND THE

MASSACHUSETTS PORT AUTHORITY

RELATIVE TO THE

FEASIBILITY OF OPERATING

A HIGH SPEED TRANSPORTATION SYSTEM

FROM GENERAL EDWARD LAWRENCE

LOGAN INTERNATIONAL AIRPORT

TO DOWNTOWN BOSTON.

(under Chapter 90 of the
Resolves of 1968
and revived and continued by
Chapter 75 of the
Resolves of 1969)

February 2, 1970

T10
M3

January 23, 1970

Mr. Wallace C. Mills
Clerk of the House
House of Representatives
State House
Boston, Massachusetts 02133

Dear Mr. Mills:

In accordance with Chapter 75 of the Resolves of 1969, we respectfully submit the attached report. The Resolve of Chapter 75 is titled, "Continuing the Investigation and Study by the Massachusetts Bay Transportation Authority and the Massachusetts Port Authority Relative to the Feasibility of Operating a High Speed Transportation System from General Edward Lawrence Logan International Airport to Downtown Boston."

If you or any members of the Senate or House of Representatives desire further information on this report, we would be pleased to respond.

Very truly yours,

EDWARD J. KING
Executive Director
Massachusetts Port
Authority

LEO J. CUSICK
General Manager
Massachusetts Bay
Transportation Authority

TPC/cfb
Enc.

REPORT ON CHAPTER 75 OF THE RESOLVES OF 1969

Chapter 75 of the Resolves of 1969 directed and authorized the Massachusetts Bay Transportation Authority (MBTA) and the Massachusetts Port Authority (MPA), "To continue the joint investigation and study authorized by Chapter 90 of the Resolves of 1968."

In accordance with the direction of the Legislature, the MBTA and the MPA have continued the study of ground transportation between Boston-Logan International Airport and points in Metropolitan Boston, particularly downtown Boston. The report authorized under Chapter 90 of the Resolves of 1968 was filed on December 18, 1968 and recommended the following:

"This study has pointed up the need for more complete data on which to plan for improved ground access between Logan International Airport and Downtown Boston. It is recommended:

1. That an origin and destination study be made of ground transportation trips between the Airport and all sections of the Downtown and of the Metropolitan Boston Air Service Area, including an analysis of the existing use of MBTA services and the attitudes of potential riders toward future improvements and use of public ground transportation services. This study could be undertaken in accordance with an interagency agreement by and between the agencies concerned with improved access to the airport: that is, the Massachusetts Port Authority, the Massachusetts Bay Transportation Authority, the Massachusetts Turnpike Authority and the Massachusetts Department of Public Works.

2. That, if the origin and destination survey indicates sufficient potential use of public transportation for airport access, further studies be conducted of the possibilities for improved access between the airport and downtown, including South Station, with connections to MBTA rail transit lines and the proposed high speed rail line between Boston and Washington. It is understood that the Federal Department of Transportation may be interested in participating in such studies."

The continuing joint investigation authorized by Chapter 75 of the Resolves of 1969 has followed three approaches to the complex problem of improving ground transportation, particularly public transportation, between the world's eighth busiest airport and its air service area:

1. The attached study, "Intra-Airport Transit System: People and Baggage" (Appendix A) has been produced by John Carl Warnecke & Associates and the MPA staff.
2. A study is now in progress by Colonel S. H. Bingham Associates for the Massachusetts Bay Transportation Authority, which is a part of the Federally-Aided Central Area Systems Study scheduled for completion in August 1970.
   The Northeast Corridor portion of this study contains the following three major elements covering engineering feasibility and cost:
   a. Extension of the Blue Line from the present terminus at Wonderland Station to a new terminal at Pines River, Revere, in the vicinity of Route 107, with a major parking lot and access to Routes 107 and I-95.
   b. Construction of an express transit track from Pines River to Airport Station via existing railroad trackage. This would provide improved access to Airport Station and Downtown Boston for passengers boarding at the Pines River terminal.
   c. A transit spur track from the vicinity of Airport Station to the Airport Terminal area. This connection would be designed to permit direct access from either the northbound or southbound direction, if possible. Consideration would also be given to a loop which would permit trains to operate through the Airport Terminal without reversing direction. There are no published preliminary results of this study available at present.

3. The MBTA and the MPA cooperated with the Massachusetts Department of Public Works in designing a Logan Airport Travel Survey which the latter submitted on August 1, 1969 to the Urban Mass Transportation Administration of the Federal Department of Transportation for a technical studies grant. (Appendix B).

The "Intra-Airport Transit System: People and Baggage" is part of a development plan for Boston-Logan International Airport. It proposes the use of an automated transit vehicle similar to those at Disneyland or Expo '67 to accommodate people and baggage transfer within the airport terminal area during the 1970's and beyond. In addition to connecting the central parking area to airline terminals, the Intra-Airport Transit System would connect with the car-rental facilities and the MBTA station.

The system report comments: "Unlike most airports, Logan already links to an existing Metropolitan Transit System. An Intra-Airport Transit System could strengthen this link, offering a means of transportation to, within, and from Logan Airport which might effectively compete with the private automobile in terms of convenience and trip time."

The Intra-Airport Transit System would be given appropriate consideration in the Logan Airport Travel Survey. The latter is designed to develop and coordinate information on ground transportation between Logan Airport and its air service area. The survey would highlight the possibilities for improved public transit between the airport and downtown Boston. Coordination of highway and public transit planning would be insured by the participation of the State Department of Public Works, the Massachusetts Turnpike Authority, Massachusetts Bay Transportation Authority, and the Massachusetts Port Authority.

A grant of two-thirds of the cost of the $80,000 study from the Urban Mass Transportation Administration of the Federal Department of Transportation is anticipated within the next month.

January 27, 1970

APPENDIX A

INTRA-AIRPORT TRANSIT SYSTEM STUDY

FOR

BOSTON-LOGAN INTERNATIONAL AIRPORT

JOHN CARL WARNECKE & ASSOCIATES
ARCHITECTS & PLANNING CONSULTANTS
NEW YORK, NEW YORK

FEBRUARY 28, 1969

VI. INTRA-AIRPORT SYSTEM: PEOPLE AND BAGGAGE

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1980 Peak Hour Estimate Chart

A. INTRODUCTION

Within the context of the Development Plan Report, this chapter considers basic qualities and requirements of an intra-airport transit system for the Boston-Logan International Airport. These considerations should act as guidelines for a design solution, enabling a manufacturer to prepare a realistic proposal within the framework of existing conditions at Logan.

Section "A" attempts to define the problem at Logan, and Section "B" lists design criteria which require consideration in the solution of this problem. Section "C" discusses the various types of systems available, inculding a brief description of specific devices now being manufactured. Section "D" compares five diagrammatic solutions Airport of 1972 to 1990 indicates a requirement for an intra-airport transit system. preferred solution. Three factors affect all conclusions regarding the intra-airport transit system: the conditions at the Logan Airport (existing and proposed), the small-scale transit systems available, and passenger amenities and safety.

The projected movement of people and baggage at the Logan International Airport for 1972 to 1990 indicates a requirement for an intra-airport transit system. Existing methods of handling luggage and of moving people between parking locations and terminals will not adequately handle the volume of traffic expected. Shuttle busses cannot provide the desired flexibility of routing that certain transit systems can offer, and during peak hours their use of airport roadways would impair traffic flow. The expanding network of roadways and buildings makes pedestrian movement between terminals very difficult. With the volume increases expected, a new approach to the handling of baggage seems mandatory.

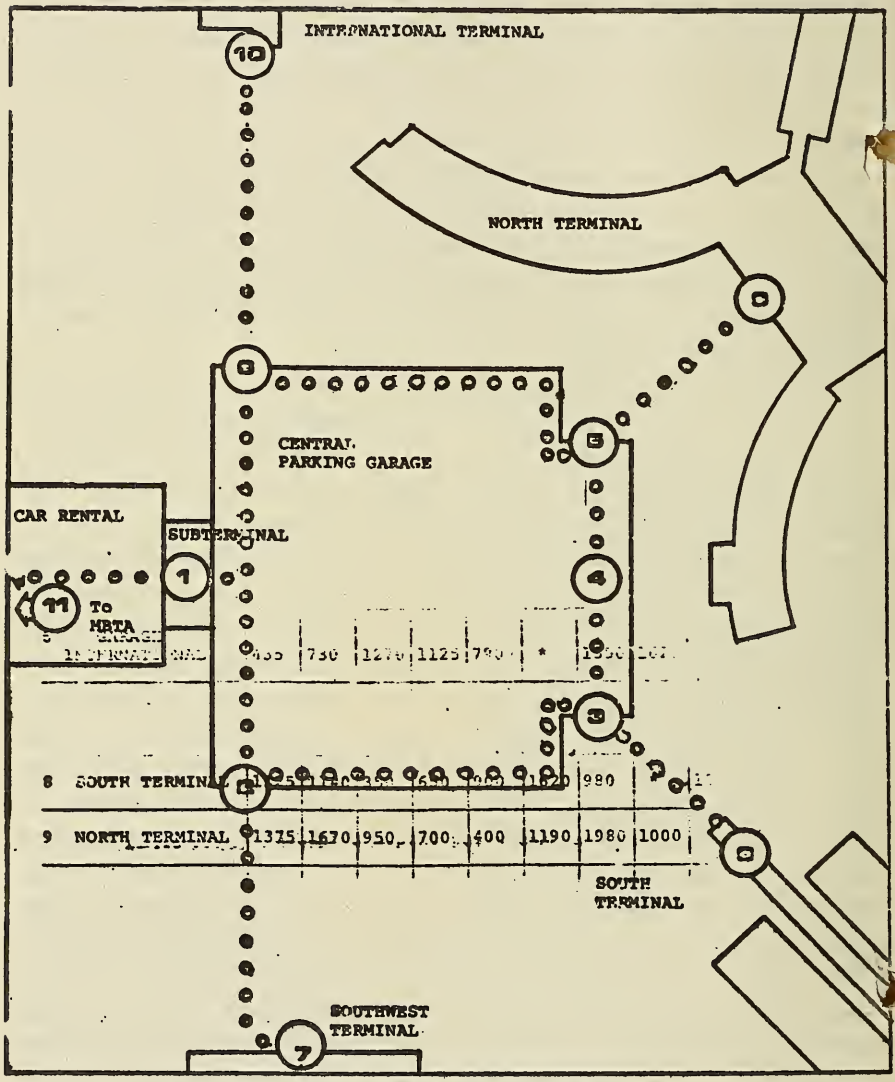
Major airports throughout the country are studying intra-airport transit systems as a means of solving passenger and baggage

movement problems. At Logan, the problem becomes one of moving people and baggage from the central parking garage and remote parking sites to the passenger terminals, between the terminals, and from the terminals back to parking locations. Besides passengers, people served would include those accompanying enplaning passengers, those greeting deplaning passengers, and airport employees. In addition to connecting parking sites to terminals, the system would connect with the car-rental facilities and the MBTA Subway. Unlike most airports, Logan already links to an existing metropolitan transit system. An intra-airport system could strengthen this link, offering a means of transportation to, within, and from Logan which might effectively compete with the private automobile in terms of convenience and trip time.

A brief study of walking distances indicated advantages of an intra-airport transit system. The average walking distance from any point in the central parking garage to the nearest terminal is 782 feet; of the people using the central garage, 14.8% are closest to the Southwest Terminal, 40.8% closest to the South Terminal, 29.6% closest to the North Terminal, and 14.8% closest to the International Terminal. This means a substantial number of people must walk farther than the nearest terminal to reach their destination, and the average distance walked increases from 782 feet to 935 feet. The addition of an intra-airport transit system substantially reduces these walking distances. For example, a system connecting the terminals with a single garage stop at the subterminal ("1" on key plan, page VI-5) reduces the average walking distance between the garage and the terminals from 935' to 405'. With the addition of a second garage stop at the east side of the garage ("4" on key plan), the average walking distance reduces to 402'. Stops at the four corners of the garage ("2", "3", "5" and "6" on key plan), in addition to a stop at the subterminal ("1"), lower the average walking distance to 268'. A chart giving walking distances between points on the key plan appears on page VI-6. As the key plan indicates, these distances are to the doors of the terminals, and do not include the walking distances within the terminals themselves.

B. DESIGN CRITERIA

The Intra-Airport Transit System must be convenient enough to



KEY PLAN - BOSTON-LOGAN INTERNATIONAL AIRPORT

WALKING DISTANCES (IN FEET)	1 SUBTERMINAL	2 GARAGE-SOUTHWEST	3 GARAGE-SOUTH	4 GARAGE-EAST	5 GARAGE-NORTH	6 GARAGE-INTERNATIONAL	7 SOUTHWEST TERMINAL	8 SOUTH TERMINAL	9 NORTH TERMINAL	10 INTERNATIONAL TERMINAL	11 M.B.T.A. SUBWAY
1 SUBTERMINAL	*	435	975	830	975	435	1055	1325	1375	1480	3700
2 GARAGE SOUTHWEST	435	*	790	1125	1270	730	620	1140	1670	1775	4135
3 GARAGE-SOUTH	975	790	*	300	550	1270	1410	350	950	1725	4675
4 GARAGE-EAST	830	1125	300	*	300	1125	1745	650	700	1580	4530
5 GARAGE-NORTH	975	1270	550	300	*	790	1890	900	400	1245	4675
6 GARAGE INTERNATIONAL	435	730	1270	1125	790	*	1350	1620	1190	1045	4135
7 SOUTHWEST TERMINAL	1055	620	1410	1745	1890	1350	*	980	1980	2395	4755
8 SOUTH TERMINAL	1325	1140	350	650	900	1620	980	*	1000	2025	5025
9 NORTH TERMINAL	1375	1670	950	700	400	1190	1980	1000	*	1220	5075
10 INTERNATIONAL TERMINAL	1480	1775	1725	1580	1245	1045	2395	2025	1220	*	5180
11 M.B.T.A. SUBWAY	3700	4135	4675	4530	4675	4135	4755	5025	5075	5180	*

BOSTON - LOGAN INTERNATIONAL AIRPORT

attract passengers over other modes of intra-airport transportation. It must provide the same flexibility in terms of routing, waiting time, and comfort as the private automobile. Stations should be located within terminals or as close to terminals as possible and walking distances from parking and gate locations to system boarding points should be minimized. The ideal system would move automatically from one station to any other station without intermediate stops and without transfers. It would achieve the same simplicity of passenger operation as an automatic elevator, becoming, in a sense, a horizontal elevator.

While passengers and baggage may well share the same track during transit between terminals, a general sense of separation of passengers and baggage is desired. Passengers should be able to check in baggage before boarding the system, and baggage claims should occur after the passenger leaves the system. Any mode of transit which requires the passenger to carry his baggage becomes inconvenient to the user and compares unfavorably with other modes of transportation.

Any long term solution to the problem of moving people and baggage efficiently at Logan must operate independently of existing traffic. This eliminates the possibility of using a mini-bus on existing roadways. Because of the high water table and utilities below grade, an elevated system appears to be the more feasible solution, as concluded by the December 18, 1968 study of "Improved High-Speed Public Transportation Between Logan International Airport and Boston". Pneumatic systems which operate efficiently underground, therefore, were not investigated in depth.

The widely fluctuating volumes of people and baggage to be moved between relatively closely spaced points indicate the advisability of an automated, driverless system. A system of driver-manned vehicles serving all terminals and the subway on a 24 hour basis would not be economically advisable in terms of operating costs, and any service curtailment to reduce operating costs would seriously lower system dependability in terms of passenger use.

Operating speeds below 15 m.p.h. will not produce an efficient system. Moving walks, operating at a top speed of three feet per second (about two m.p.h.), do not offer a workable solution to intra-terminal movement. A non-stop trip from the International Terminal to the South Terminal would take over 13 minutes at this speed, and the trip from the M.B.T.A. Subway to the International Terminal would take almost 30 minutes.

The following criteria are not intended as a system specification, but rather as a guide to a system design which could achieve the desired level of sophistication.

1. The operation and routing of the system should be easily comprehendible by a passenger on his initial ride.
2. The elderly, physically handicapped, and people carrying small children must be able to comfortably negotiate the system.
3. Baggage check-in and claim stations should be easily accessible and clearly identified.
4. There should be adequate room to accommodate passengers with carry-on baggage, wheelchairs, and such out-size items as skis.
5. The actual ride should be as comfortable as possible, with attention to smooth operation, low noise level, and view. Acceleration and deceleration should be limited to levels compatible with passenger comfort and safety, yet high enough to prevent slowing the system. The acceleration limit should probably be around 3 m.p.h. per second and the change of acceleration or deceleration rate ("jerk") should be held to around 1.5 m.p.h. per second.
6. Waiting time should be minimal and transfers within the system should be avoided.
7. Passengers must not cross any tracks or vehicle lanes to reach stations.
8. Stations and cars should be completely enclosed, well lighted, and air conditioned.
9. Stations should be connected to terminals so that no passenger is required to walk outside once he has entered the system.
10. Simultaneous-acting elevator-type doors should be provided in cars and stations. This provides a high safety factor and allows air conditioning levels to be maintained in all stations. Cars will probably require doors on two sides to accommodate all station configurations.
11. Stations should be located to minimize passenger confusion. Doors which open facing into a terminal, for instance, are preferrable to doors which open towards a blank wall.

12. Connection to terminals should be sensitive to the existing architectural conditions.
13. The structure of the transit system should visually reinforce the general structure of the airport, serving to unify the buildings rather than to further complicate existing conditions.
14. The system must be capable of additions and alterations.
15. Preference should be given to a relatively light-weight system.
16. Fumeless operation is required.
17. The system must not radiate radio interference or electromagnetic interference that might impair aircraft communication and guidance operations.
18. No systems with top operating speeds below 15 m.p.h. should be considered.
19. The system must be capable of operation during all weather conditions.
20. The system must operate on a 24 hour basis.
21. The system must be flexible enough to carry loads which vary from only a few passengers per hour during slack periods to 13,000 passengers per hour during peak hour periods. A reasonable allowance for overload conditions should be made.
22. Stations must be adequately designed for peak hour loads.
23. Economy of operation and maintenance must be considered.
24. System management must be considered, including vehicle maintenance and storage and the possibility of fare collection.
25. Maximum passenger safety must be assured, and system design must comply with all codes, laws, ordinances, rules, regulations and orders of appropriate public authorities bearing on the work.

C. SYSTEMS AVAILABLE

Several companies are presently involved in the manufacture of small scale transportation devices. Many of these devices are described in Appendix "C" of the December 18, 1968 study of "Improved High-Speed Public Transportation Between Logan International Airport and Downtown Boston" by the Massachusetts Bay Transportation Authority and the Massachusetts Port Authority. The December 1968 report very realistically accesses these systems,

listing general characteristics and making clear their limited availability for immediate application. Some duplication will occur in the following report, which attempts to present a basic catalog of systems available.

The automatic, above grade systems discussed below fall into three general categories: train, capsule, and belt. In the train category, cars approximately the size of a bus operate singly or in groups along fixed loops or shuttles, usually without automatic switching and multiple route possibilities. In the capsule category, cars approximately the size of a private automobile operate singly along a multiple-route system with automatic switching. Through a system of express and local tracks, capsules may by-pass intermediate stops and go directly to the destination designated by the passenger. Cars stopped on local tracks do not impede the traffic flow of the express track. In both the train and capsule types, a central computer directs all traffic. In the belt category, continuously moving capsules slow to around 1.5 m.p.h. at station stops and accelerate to around 15 m.p.h. between stations. Intermediate stops are generally not feasible with this system type.

TRAIN CATEGORY

Guide-O-Matic Train (Barret Electronic Corporation)

This is the smallest of the train systems investigated, each train consisting of three cars with eight seats and a forward power unit containing batteries that supply power to dual real wheel motors. The train is 7'-6" high, 5'-0" wide, and 45'-0" long. Trains follow a guidance cable laid in the floor, and passenger capacity is rated at 1,200 people per hour. The Houston Airport has chosen this system for a passenger shuttle.

The low passenger capacity and on-board power unit would seem to make this system unacceptable for Logan.

Minirail (Habeggar)

Three sizes of trains are presently manufactured by Habeggar, ranging in width from 4'-4" to 6'-3", in height from 5'-0" to 8'-0", and in length from 105' to 154'. Individual cars are large enough for carry-on baggage; trains consist of 8 to 16 cars and carry a total of 60 (type 1) to 245 (type 3) passengers. Trains travel automatically at 8 to 21 m.p.h. with a 60 second headway,

carrying 3,000 to 13,000 passengers per hour. Minimum turning radii range from 50' (type 1) to 160' (type 3), and maximum grades negotiable range from 6% (types 1 and 3) to 10% (type 2). The train runs on rubber tires locking into a boxgirder track, and has supports at around 75' to 100' on center. Installation and operating costs are claimed to be low. Installations have been made at Expo Montreal, Pleasure Beach (Blackpool, England), Munich Fairgrounds, Fuji Highland (Japan), Expo Lausanne, and the California Exposition (under construction).

The small scale of the system makes it applicable to Logan if the passenger capacities can be increased to the level required.

Transit Expressway (Westinghouse)

Electrically propelled cars 8'-6" wide, 10'-0" high, and 30'-6" long carry 28 seated passengers. Cars travel singly or in groups up to four per train at a maximum speed of 50 m.p.h. with a 2 minute headway between trains. Cars run on four pairs of pneumatic tires along the elevated roadway; horizontal guide-wheels engage a central "guide beam" between the tracks for stability; operation is claimed to be extremely quiet. The minimum turning radius is 150'; the relatively lightweight roadway requires supports 60' on center. The estimated cost of the system is $2.5m per mile. An installation of the system is under construction at the Tampa Airport, and a proposal has been made for the Seattle-Tacoma Airport.

The Transit Expressway is the largest scale system reviewed, and intended mainly for larger installations than the Logan plan would require. The large car size and high turning radius limit its flexibility within existing conditions. It seems, however, to be more fully developed than most other systems studied.

CAPSULE TYPE SYSTEMS

Dashaveyor (Dashaveyor Company)

Twelve passenger cars approximately 6' wide and 18' long move singly or in groups up to 20 through a network of express and local tracks, bypassing intermediate stops and automatically stopping at the desired station. Speeds of up to 80 m.p.h. may be achieved, although 30 m.p.h. is more common. Headway between capsules is one minute. Capsule wheels run within an enclosed,

tubular guideway and are electrically propelled. The car is capable of vertical ascents up to 90 degrees and the minimum turning radius is 10'. The passenger capacity is 10,000 per hour. As with all capsule systems, automatic routing of capsules allows baggage handling cars to utilize the intra-airport network of guideways. Estimated cost of the Dashaveyor system is $528,000 per mile of guideway. This system has been proposed for the Los Angeles International Airport and the Seattle-Tacoma International Airport.

The scale and flexibility which Dashaveyor claims make the system highly applicable to Logan. If the passenger capacity could be increased to the desired level and the computer controls proven operational, the system should be seriously considered.

Jetrail (Stan-Ray Pacific Corporation)

The Jetrail system is similar to the Dashaveyor system, except its guideway mechanism appears less flexible. Three types of cars are listed, varying in width from 6'-0" to 6'-8", and in length from 11'-5" to 18'-3". All cars are 7'-6" high. Passenger capacities per car vary from 14 to 30. Cars move at speeds of up to 20 m.p.h., and the minimum turning radius is 15'. The system is capable of carrying up to 11,000 people per hour and baggage-carrying cars may be employed within the network. A simplified system is presently being installed at Love Field in Dallas.

If sufficiently operational, the system seems potentially applicable to Logan.

Self-Routing Taxi System (Brush Electric Engineering Co.)

Four passenger capsules 6' wide operate automatically at a top speed of 35 m.p.h. over a multiple-route system. Passenger capacity is 10,000 - 15,000 per hour. The system is backed by the British National Research Development Corporation and the Ministry of Transport.

This system is in a very early stage of development, and more information is not available at this time.

Transivator (Sky-Kar)

Six passenger capsules with room for six standees operate automatically at 20-25 m.p.h. (60-70 m.p.h. possible) over a multiple route system. The maximum grade is 10%, and the estimated cost is $2m per mile. The manufacturer has made a proposal for the Fort Worth Central Business District.

This system appears to be in an early stage of development.

Starrcar (Alden Self-Transit Systems Corporation)

Two passenger capsules operate automatically on a system of local and express guideways, 6½' wide. Cars reach a top speed of 40 m.p.h., and headway between cars is 25 to 50 feet on local lines and 50 to 100 feet on express lines. Passenger capacity is 10,000 per hour, with a possibility of 27,000 per hour indicated. The minimum turning radius is 15 feet. Baggage-carrying cars may be integrated into the system. Passenger stations require a minimum siding length of 250' (a standard applicable to all capsule systems). Estimated cost of the system is $1m per mile of guideway plus $2,000 per car. Estimated cost of operation is 4.5 cents to 10 cents per mile; supposedly the system can break even financially with a minimum of 6,000 passengers per day. Proposals have been made for Columbia, Md.; Regina, California; JF Kennedy Airport, New York; Worcester, Massachusetts; and Interama Exposition (Florida).

Like the Dashaveyor system, the Starrcar appears applicable to Logan if computer controls can be proven operational, and should be seriously considered.

Teletrans (Docutel Corporation)

Four passenger capsules move at a top speed of 45 m.p.h. through this automatic system, operating on special aluminum rails running in elevated tubes or on more conventional elevated tracks. As with all capsule systems, Teletrans is lighter in weight than conventional rapid transit systems, and claims to be even lighter than the train-type systems described above. Passenger capacity is estimated at 20,000 per hour. Baggage-carrying capsules may be integrated into the system. Cost is estimated at $2.1m per mile of elevated tube, and around $1200 per capsule. American Airlines have contracted Teletrans to study baggage handling in airports.

Since the Teletrans Corporation has been absorbed by the Docutel Corporation, emphasis seems to have shifted from a passenger handling to a baggage handling system.

Zip System (Jarvis B. Webb Company)

Three passenger capsules move at a top speed of 20 m.p.h. through this system, which is capable of integrated baggage handling.

The system appears to be in a very early stage of development.

BELT-TYPE SYSTEMS

Carveyor (Stephens-Adamson Manufacturing Company)
The Carveyor, as all belt-type systems, operates on the principle of continuously moving vehicles. Cars proposed vary from 5'-2" to 8'-2" in width, are 7'-0" long, and 7'-0" to 7'-2" high. They carry from 4 to 32 passengers, and move at 15 m.p.h. between stations. Within stations the cars slow to 1.5 m.p.h. for continuous boarding from conveyor belts moving at the same speed. The system can achieve a maximum passenger capacity of 22,000 per hour. The minimum turning radius is 81'. The estimated cost is $4.8m – $7.4m per mile. Proposals include New York's Welfare Island and Times Square Shuttle, downtown distribution in Los Angeles and Atlanta, the Tampa Airport and the Seattle Exposition. A comparable system (the Carlator) has been operating in an amusement park in Japan for three years.
As with all belt-type devices, the Carveyor must operate at full capacity at all times, and is therefore not as flexible as other systems. And like the train-type systems, stops must be made at intermediate stations by all passengers regardless of their destinations.
Peoplemover (Goodyear)
Similar to the Carveyor, the Peoplemover concept involves a continuous flow of cars moving at 12 m.p.h. between stations and slowing to the speed of moving platforms in the stations, where dynamic loading from continuously moving belts is achieved. Cars are 6'-0" wide, 4'-8" high, weigh 650 pounds each, and move in clusters of four cars which form a train 31 feet long. Headway between trains is 11.803 seconds, the minimum rurning radius is 20 feet, and the maximum grade is 15%. Passenger capacity is 4,800 per hour, and the estimated cost of the system is $2.6m per mile. One installation has been made at Disneyland, a second is under construction at Disneyworld, and proposals have been made for New York's Times Square Shuttle and the Chicago Loop.
The speed and passenger capacity for such a non-flexible belt system seem below minimum standards for application at Logan.
Transveyor (Batelle Memorial Institute)
Continuously moving platforms approximately 4'-6" by 6'-0"

operate on a shuttle principle connecting two stations. Passengers board the system in a manner similar to boarding an escalator, by stepping onto the platforms moving at 1.5 m.p.h. As the platform passes a fixed point, elevator-type doors close first in front, then behind the passengers aboard each platform. These platforms, now completely enclosed, then separate from the continuous chain of platforms and accelerate to 15 m.p.h. until the next station, where the reverse procedure occurs. Each platform carries 6 passengers with ample room for baggage. Headway between 15 m.p.h. platforms is 2.08 meters, and maximum grade negotiable is 35 degrees. Passenger capacity is 7,000 to 8,000 per hour. No intermediate stops are possible, but the system can have branches. The Transveyor was designed for application at the Paris Nord Airport.

Route inflexibility severely limits the application of this system to Logan.

D. SYSTEM DIAGRAMS

Five diagrams of possible system layouts for the Boston-Logan International Airport have been prepared to assist in the evaluation of equipment available and to offer guidelines in the development of an actual solution. These diagrams indicate general locations for guideways and stations: any developed design of an intra-airport transit system would necessarily differ from these diagrams as more detailed considerations of existing and proposed roadways and buildings were made. These diagrams do not indicate sidings for car storage and maintenance, which would necessarily be a part of any transit system. Nor do they indicate specific track and station configurations, which would again be part of a more detailed design concept.

As stated in the first section of this report, guideways and stations are assumed to be elevated. Stations would be completely enclosed, with an enclosed connection to the terminal being served. Under optimum conditions, the system would enter the terminal for direct distribution to gate areas, as shown in Diagram 4. Under other conditions, stations might occur at mezzanine levels connecting to terminal lobbies. At the Southwest Terminal, for instance, a small scale system might enter the front colonnade at an elevation above

the enplaning roadway, with the station bridging the enplaning vehicular traffic and connecting directly to the central space of the terminal. A similar connection could be made at the North Terminal, with the station located above the elevated roadway and again connecting directly with the interior of the main terminal. At the South Terminal, a small-scale system utilizing a short turning radius could enter the space between the wings of the building at an elevation above the enplaning level and below the parking levels. With a multiple loop system, the sub-loop serving the South Terminal could penetrate to the central space of the main concourse level itself, the station occurring on a mezzanine level above the southwest concession area. The Subterminal Station would occur at the second level elevation of 29'-8". Sections indicating these possible station locations are shown on Diagrams "6" and "7"; these sections are keyed on Diagram "3". At the North Terminal and East Garage, the guideways of a system under 10' high could also occur at the elevation of the existing pedestrian bridges. This is not desirable, however, as it would block pedestrian access from the garage to the terminals and force the transit system into a must-use situation. In all cases, the guideway would, of course, have to clear the elevated roadways.

A study of the chart "Estimated Number of People Using IATS at Peak Hour in the 1980's" (see appendix) indicates that the bulk of the traffic occurs between the parking garage and the terminals. These figures were based on the projected movement of the total number of airline passengers during a peak hour period, with a factor of one-third added for airport visitors and employees. A single loop connecting all terminals with the M.B.T.A. Subway stop and remote parking (as proposed by the MIT report, "Project Metran") would force about 13,000 passengers per peak hour to travel 7600' or more extra feet to stops which only 1,850 would use. This type of system was eliminated as inefficient.

In the diagrams which follow, the relatively small fraction of traffic from the M.B.T.A. Subway stop and from remote parking is handled by means of a shuttle or spur connecting with the subterminal. From the subterminal, which joins the central parking garage and the car-rental facilities and acts as an intra-airport transportation hub, connection is made to the major loop or loops

circulating to all terminals and in some cases to other garage stops. Circulation along this major loop is one-way.

In studying the average walking distance from the garage to the terminals, it appears advisable to have at least two transit stops serving the garage. Because the main loops of all the loop diagrams necessarily pass through the short distance separating the control tower of the North Terminal from the Central Garage, a natural location for this second garage stop appears to be at the center axis of the east side of the garage. A stop at this location develops the existing circulation node created by the pedestrian bridge, and seems a natural point of attraction for pedestrian circulation. Because all loops pass by this location, no additional track is required. Stations at this location are shown in Diagrams "1", "2", and "3".

As discussed in Section C. an integrated baggage handling system becomes feasible only with a computer-controlled, multiple-route capsule system. If baggage were carried by fixed route train or belt-type system, loading and unloading would necessarily occur at the same level as the passenger stations. The labor and machinery to transfer this baggage to terminal handling areas would probably outweigh any advantage of this method of transport, assuming the possibility of effecting this transfer without hindering passenger movement.

With the capsule type systems shown on Diagrams "3" and "4", baggage cars can be automatically switched off the main feeder tracks onto a separate network of baggage tracks serving ground-level terminal hold areas. The additional load imposed on the transit system by the baggage cars would be a significant factor in sizing the main feeder lines and computer controls of the system.

The five diagrams attached to this report are described on the following pages. Accompanying each description is a chart giving track length, number of stations, and trip distances for the diagram in question. In the diagrams themselves, guideway and station indications are not shown to scale. Major one-way loops are shown by a thicker line than minor loops. Baggage feeder lines within terminals, which would probably occur at a lower elevation, are indicated by dotted lines. In Diagrams "1", "2", "3", and "4", an optional stop at the hotel is shown.

Diagram 1: *Single Loop System With Shuttle*

Diagram 1 develops a system using a minimum turning radius of 150' which would accommodate all train-type systems studied, including Westinghouse. Guideways reinforce the outer line of the main elevated roadway where possible, staying well clear of the buildings. Station "2" at the Southwest Terminal would occur outside the proposed two-story parking structure, and Station "3" would connect with the moving walks serving the South Terminal. Moving walks would also be advisable at the Southwest Terminal with this system. The garage stop at "4" could connect with the North Terminal; a second stop at the North Terminal would occur at "5", the 150' minimum radius being too large to maneuver effectively into the central block of the terminal.

A shuttle connects the M.B.T.A. Subway stop and remote parking with the single closed loop: transfers between the shuttle and the loop would occur at the Subterminal. A direct spur of the M.B.T.A. Subway could connect with the Subterminal transfer point in place of the shuttle line shown.

With its single closed loop and separate shuttle, this system would have a simpler operation than the other diagrams. It solves the basic problem of interconnecting the terminals with each other and with the central parking garage, car-rental facilities, subway stop, and remote parking. Average walking distance from any point in the central garage to the nearest intra-airport transit system stop is reduced from 935' (no system) to 402'. Utilizing existing pedestrian bridges, somewhat lengthy connections could be made to the system from the central garage at stations "5", "3", and "2".

A major drawback to this system is its failure to deliver passengers to meaningful locations at the Southwest and South Terminals, a condition inherent in a large turning radius layout. A second disadvantage to the system is the necessity of the transfer from the shuttle to the loop.

DIAGRAM 1: SINGLE LOOP SYSTEM WITH SHUTTLE

Length of Single Track: 4,470' x 1 = 4,470'
Length of Double Track
(MBTA Shuttle) : 3,800' x 2 = 7,600'

Total Length of Track : 12,070'

Number of Stations: 8

Minimum Turning Radius: 150'

TRIP DISTANCES IN FEET

From: \ To:	SUBTERMINAL	SOUTHWEST TERMINAL	SOUTH TERMINAL	PARKING GARAGE-EAST	NORTH TERMINAL	INTERNATIONAL TERMINAL	HOTEL	M.B.T.A. SUBWAY
1 SUBTERMINAL	*	715	1490	1915	2605	3405	1200	3800
2 SOUTHWEST TERMINAL	3755	*	775	1200	1890	2690	4955	7555
3 SOUTH TERMINAL	2980	3695	*	425	1115	1915	4180	6780
4 PARKING GARAGE EAST	2555	3270	4045	*	690	1490	3755	6355
5 NORTH TERMINAL	1865	2580	3355	3780	*	800	3065	5665
6 INTERNATIONAL TERMINAL	1065	1780	2555	2980	3670	*	2265	4865
7 HOTEL	1200	1915	2690	3115	3805	4605	*	2600
8 MBTA SUBWAY	3800	4517	5290	5715	6405	7205	2600	*

Diagram 2: *Single Loop System With Spur*

Diagram 2 develops a system with a smaller turning radius (50') which allows the guideways to maneuver more easily in approaching the buildings. Guideways reinforce the outer line of the main elevated roadway, opening at each terminal. Stations connect directly to terminals without the need of moving walks. Automatic switching is used at the Subterminal (station "1") to avoid the necessity of transfer: trains from the subway stop may move directly into the main loop; trains circulating along the main loop may bypass the subway stop spur. Sidings at each station are shown to allow moving cars to bypass those cars stopped at stations; with these sidings the system may be adapted to use by train-type or capsule-type systems. In a train-type system, these sidings could be eliminated. A chart showing peak hour loadings for this system appears on page VI-34. These figures are also applicable to Diagrams "1" and "3", and are based on the table, "Estimated Number of People Using IATS at Peak Hour in the 1980's".

This small-radius system maintains the simplicity of a single-loop system while delivering passengers to convenient locations. Eliminating the transfer requirement at station "1" also contributes to the convenience of the system.

The track installation is longer than for system "1", and trip distances between terminals show a corresponding increase.

Diagram 3: *Multiple Loop System*

Diagram 3 develops a multiple loop layout for a capsule-type system, utilizing the small turning radii of the capsule systems for close maneuvering into terminal areas. A compact express loop along the inside line of the major elevated roadway connects with local loops which serve each terminal. With certain lightweight capsule systems, the possibility exists of supporting the express guideways from the garage structure. The small scale of the capsule system would allow the guideways to enter between the north wings of the South Terminal, directly serving the central concourse area.

As discussed earlier, the computer-controlled multiple routings of the capsule system allow the integration of baggage handling.

DIAGRAM 2: SINGLE LOOP WITH SPUR

Length of Single Track: 5,615' x 1 = 5,615'
Length of Double Track
(MBTA Spur) : 3,800' x 2 = 7,600'

Total Length of Track : 13,215'

Number of Stations: 8

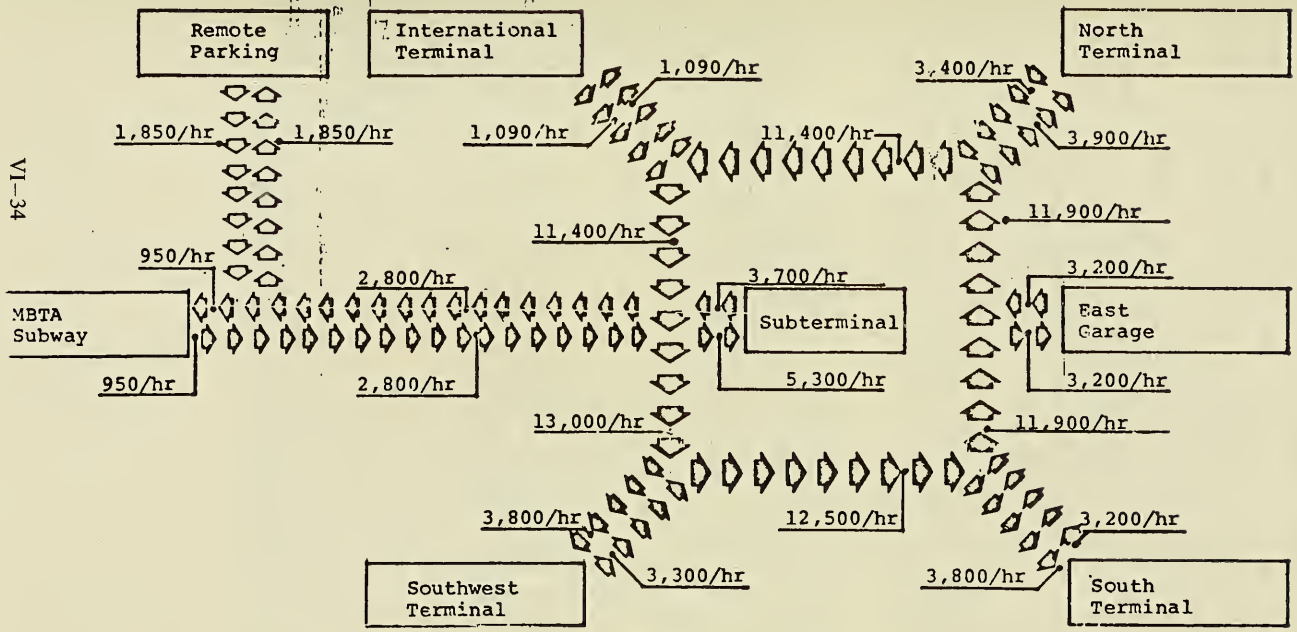
Minimum Turning Radius : 50'

TRIP DISTANCES IN FEET

From: \ To:	1 SUBTERMINAL	2 SOUTHWEST TERMINAL	3 SOUTH TERMINAL	4 PARKING GARAGE-EAST	5 NORTH TERMINAL	6 INTERNATIONAL TERMINAL	7 HOTEL	8 M.B.T.A. SUBWAY
1 SUBTERMINAL	*	1095	2090	2760	3320	4545	1200	3800
2 SOUTHWEST TERMINAL	4520	*	995	1665	2225	3450	5720	8320
3 SOUTH TERMINAL	3525	4620	*	670	1230	2455	4725	7325
4 PARKING GARAGE EAST	2855	3950	4945	*	560	1785	4055	6655
5 NORTH TERMINAL	2295	3390	4385	5055	*	1225	3495	6095
6 INTERNATIONAL TERMINAL	1070	2165	3160	3830	4390	*	2270	4870
7 HOTEL	1200	2295	3290	3960	4520	5745	*	2600
8 M.B.T.A. SUBWAY	3800	4895	5890	6560	7120	8345	2600	*

INTRA-AIRPORT TRANSIT SYSTEM

Estimated Peak Hour Loading Conditions
For The 1980's As Applied To Diagram "2"



NOTE:
Figures include total number of airline passengers, visitors, and employees using system during peak hour.

The dotted lines on the diagram indicate points at which baggage vehicles could switch off of the passenger system and descend to a lower baggage control area. From the loops indicated by the dotted lines, connections could be made to a baggage guideway network in each terminal.

No transfers are necessary, no stopped cars hinder express movement. The compact center loop provides shorter trip distances between distant stations.

The track length required is greater than for Diagrams "1" or "2". Aesthetically, the guideway installation would probably appear less pleasing to a person driving through the airport roadways than the guideways of Diagram "2". The relative complexity of the multiple routings requires fully operational computer controls.

Diagram 4: *Full Multiple Loop System*

The full multiple loop system represents a development of the multiple loop system. In this diagram, capsules on each terminal sub-loop may circulate independently of the express loop, which occurs at a higher elevation. Connection between loops is achieved by circular ten-degree ramps. Garage stations connecting directly with each terminal occur at "2", "3", "4", and "5". This diagram also shows the possibility, without route determination, of the capsule guideways entering each terminal. While only one station is shown within each terminal, more would probably occur. Guideways within terminals would require extensive study of existing architectural conditions, and installation would be costly.

The additional garage stations reinforce the pedestrian circulation in the garage and reduce the average walking distance to 268'. This optimum system offers the greatest flexibility and routes of all the diagrams. This system is also the most complex and would offer many problems in computer programming.

DIAGRAM 4: FULL MULTIPLE LOOP SYSTEM

Track Lengths

Single Track: 3,130' x 1 = 3,130'
Double Track to Terminals: 1,880' x 2 = 3,760'
Single Track in Terminals: 5,675' x 1 = 5,675'
Double Track to MBTA : 3,800' x 2 = 7,600'

Total Length of Track: 20,105'

Number of Stations: 8

Minimum Turning Radius : 25'

NOTE: Distances shown to point of entry in terminals; and do not include distances within each terminal.

TRIP DISTANCES IN FEET

From: \ To:	1 SUBTERMINAL	2 GARAGE-SOUTHWEST	3 GARAGE-SOUTH	4 GARAGE-NORTH	5 GARAGE-INTERNATIONAL	6 SOUTHWEST TERMINAL	7 SOUTH TERMINAL	8 NORTH TERMINAL	9 INTERNATIONAL TERMINAL	10 HOTEL	11 M.B.T.A. SUBWAY
1 SUBTERMINAL	*	625	1260	1940	2655	1085	1885	2230	3180	1200	3800
2 GARAGE-SOUTHWEST	2505	*	635	1315	2030	460	1260	1605	2555	3705	6305
3 GARAGE-SOUTH	1870	2495	*	680	1395	2955	625	970	1920	3070	5670
4 GARAGE-NORTH	1190	1815	2450	*	715	2275	3075	290	1240	2390	4990
5 GARAGE-INTERNATIONAL	475	1100	1735	2415	*	1560	2360	2705	525	1675	4275
6 SOUTHWEST TERMINAL	2965	460	1095	1775	2490	*	1720	2065	3015	4165	6765
7 SOUTH TERMINAL	2495	3120	625	1305	2020	3580	*	1595	2545	3695	6295
8 NORTH TERMINAL	1480	2105	2740	290	1005	2565	3365	*	1530	2680	5280
9 INTERNATIONAL TERMINAL	1000	1625	2260	2940	525	2085	2885	3230	*	2200	4800
10 HOTEL	1200	1825	2460	3140	3855	2285	3085	3430	3380	*	2600
11 M.B.T.A. SUBWAY	3800	4425	5060	5740	6455	4885	5685	6030	6980	2600	*

Diagram 5: *Radial System*

Diagram 5 develops a system which could employ a belt-type device. It becomes essentially a system of five two-way shuttles connecting the four terminals and the M.B.T.A. Subway stop with the Subterminal ("1"). This Subterminal transfer point would by necessity occur above the highest level of the garage, enabling the shuttles to radiate out across the garage structure. Between the garage and each terminal, the guideways could slope down to a lower elevation.

This is one of the simplest of all systems in terms of operation. It would accommodate most types of equipment, including even moving walks, and is presently operational. The system could deliver passengers directly to terminals.

This system, however, lacks passenger convenience. The nature of the belt-type systems makes intermediate stops awkward or impossible, resulting in only one stop for the garage. The average walking distance to this stop would be 568', and over one-third of the people using the central garage would be closer to the terminals than to the subterminal stop. The vertical circulation required to teach the subterminal is also inconvenient, making the system less accessible to the passengers. The required transfer at the Subterminal for movement between terminals and for movement from the subway to the terminals is also a great inconvenience. Long guideway installations are required, and the system is visually weak in terms of the total airport structure.

E. CONCLUSION

In concept, the capsule-type system appears the most suited for application at the Boston-Logan International Airport. Vehicles which go directly to passenger-designated destinations without intermediate stops offer to the individual passenger a convenience comparable to a private automobile. Two to six passenger capsules provide a sense of comfort and privacy unmatched by any other transit system. Empty capsules waiting on each station siding can eliminate waiting time. During slack hours, the system can idle in the manner of an automatic elevator, responding only on call. With the capsule-type system, as stated above, an integrated baggage-handling

DIAGRAM 5: RADIAL SYSTEM

Length of Double Track to Terminal: 4,325' x 2 = 8,650'
Length of Double Track to MBTA : 3,800' x 2 = 7,600'

Total Length of Track : 16,250'

Number of Stations: 6

Minimum Turning Radius: 450'

TRIP DISTANCES IN FEET

From: \ To:	1 SUBTERMINAL	2 SOUTHWEST TERMINAL	3 SOUTH TERMINAL	4 NORTH TERMINAL	5 INTERNATIONAL TERMINAL	6 M.B.T.A. SUBWAY
1 SUBTERMINAL	*	800	1450	1150	925	3800
2 SOUTHWEST TERMINAL	800	*	2250	1950	1725	4600
3 SOUTH TERMINAL	1450	2250	*	2600	2375	5250
4 NORTH TERMINAL	1150	1950	2600	*	2075	4950
5 INTERNATIONAL TERMINAL	925	1725	2375	2075	*	4725
6 M.B.T.A. SUBWAY	3800	4600	5250	4950	4725	*

system becomes possible. Using a train or belt system would require a separate system of tracks and controls to move baggage automatically between terminals.

Train and belt systems operate well on shuttles or simple loops under normal loading conditions. Neither system, however, can adapt as completely as the capsule-type system to more complicated routings and widely varying load conditions. Consideration of these two factors, Multiple Routing and Varying Loads, becomes essential in a solution for Logan. To ignore these factors would result in a compromise solution, a solution which would become outmoded long before it had served it purpose. The belt-type system, as discussed in Section C, operates at full capacity or not at all. Therefore, as many cars would be circulating during slack hours as during peak hours. Automatic switching is impossible, and intermediate stops are, at best, awkward. The train-type system can lower its operating capacity, but regular dispatching of relatively large vehicles during slack hours would be required to carry as few as one or two passengers from the subway stop, for instance, to one of the terminals. And during rush hours, trains stopped at stations for loading and unloading would hinder all systems movement.

Diagrams "2" and "3", utilizing a capsule system with express and local track, appear the more suitable for application at Logan. Diagram "2" applies also to a train system, and in this capacity works more effectively in terms of passenger convenience than the train system of Diagram "1". Diagram "4" offers an optimum solution in comparison to the other diagrams, but seems more elaborate than the distances at Logan require. It probably remains less complex in terms of its multiple routing that a fully automatic baggage system would be. As discussed in Section D, the Radial System (Diagram "5") appears the least suited to application at Logan. The diagrams may, of course, be combined in a variety of ways. For example, the shuttle of Diagram "1" may be substituted for the spur in Diagram "2".

Both trains and belts are more nearly operational today than capsules. The fact that several manufacturers claim a capsule system, however, indicates a growing technology in the field. Before 1975, chances appear favorable for the development of a fully operational capsule system.

LIST OF MANUFACTURERS REVIEWED

1. Name: Carveyor
   Mfr.: Stephens-Adamson Manufacturing Company
   Ridgeway Avenue
   Aurora, Illinois 60507
2. Name: Dashaveyor
   Mfr.: Dashaveyor Company
   1042 Princeton Drive
   Venice, California 90291
3. Name: Guide-O-Matic Train
   Mfr.: Barrett Electronics Corporation
   Northbrask, Illinois 600062
4. Name: Jetrail
   Mfr.: Stan Ray Pacific Corporation
   11683 South Alameda
   Los Angeles, California 90002
5. Name: Minirail
   Mfr.: Habeggar
   Constam Sales Corporation
   65 West Louise Avenue
   Salt Lake City, Utah
6. Name: Peoplemover
   Mfr.: Goodyear Tire & Rubber Company
   Product Planning & Development
   Akron, Ohio 44316
7. Name: Self-Routing Taxi System (Auto-Taxi)
   Mfr.: Brush Electric Engr. Company
   Louthborough, Lestershire, England
8. Name: Starrcar
   Mfr.: Alden Self-Transit Systems Corporation
   25 Brigham Street
   Westboro, Massachusetts 01581
   Name: Teletrans
   Mfr.: Docutel Corporation
   2600 Stemmons Freeway
   Suite 206
   Dallas, Texas 75207

10. Name: Transit Expressway
Mfr.: Westinghouse
Transportation Systems Department
Research & Development Center
Pittsburgh, Pennsylvania 15235

11. Name: Transivator
Mrf.: Sky-Kar
Trans America Building
Seventh and Main
Fort Worth, Texas 76102

12. Name: Transveyor
Mfr.: Batelle Memorial Inst.
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

MANUFACTURERS NOT REVIEWED

1. Name: Twelve Passenger Monorail Car. .15 m.p.h.
Mfr.: Arrow Equipment Company
Sunnyvale, California

2. Name: "Lounge Car" (100 passenger trains composed of 3 or 4 cars)
Mfr.: General Electric
Transportation Systems
570 Lexington Avenue
New York, New York

3. Name: Automated, Intra-Airport Transit System
Mfr.: Pullman-Standard
200 South Michigan Avenue
Chicago, Illinois 60604
Mr. James C. Pontious, Transit Marketing Manager

4. Name: Scot Car (Small, Intra-City Vehicle)
Mfr.: United States Steel Corporation
Five Gateway Center
Pittsburgh, Pennsylvania

Estimate of People Who Could Use IATS at a Peak Hour in the 1980's *

From \ To	CENTRAL PARKING	RENT-A-CAR	MBTA STATION	REMOTE PARKING	SOUTHWEST TERMINAL	SOUTH TERMINAL	NORTH TERMINAL	INTERNATIONAL TERMINAL
CENTRAL PARKING[1]					2000	1920	2000	480
RENT-A-CAR[2]					670	800	670	
MBTA STATION[3]					290	280	290	90
REMOTE PARKING[4]					580	560	580	130
SOUTHWEST TERMINAL	2000	160	290	580		30[5]	130[5]	130[5]
SOUTH TERMINAL	1920	190	280	560	30[5]		130[5]	130[5]
NORTH TERMINAL	2000	160	290	580	130[5]	130[5]		130[6]
INTERNATIONAL TERMINAL	480		90	130	130[5]	130[5]	130[5]	

* This estimate of peak hour use is based on a distribution of projected passenger use at each airport facility. Each projected movement volume is increased by one-third to allow for visitor, employee, or other type of user movement.

1 Two people per car related projected entry and exit volumes in 1980. Assume all people will use IATS.

2 Projected check-in volume in 1980 for a Friday P.M. peak hour used.

3 Existing 5% of total passenger volume projected to 1990 passenger level.

4 Assume 10% exiting and entrance at remote parking of 7000 spaces. Two people/car.

5 Figures are based on existing interline movements. 6.0% of passengers transfer. Northeast is responsible for 42% of transfers.

6 Assume that International Terminal will in time cause significant interline movement from domestic carriers. Assume 5% of domestic passenger volume will move to International at peak hour.

APPENDIX B

Application of
The Massachusetts Department
of Public Works
for Technical Studies Grant
for
The Logan Airport Travel Study
under The
Urban Mass Transportation Act of 1964
as amended

June 11, 1969

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C. Map of Logan-Boston Airport Showing General Location

Mr. C. C. Villarreal, Administrator
Urban Mass. Transportation Administration
Department of Transportation
Washington, D. C. 20591

Dear Mr. Villarreal:

The Massachusetts Department of Public Works hereby applies for a Technical Studies Grant of $54,000 (approximate) under the Urban Mass Transportation Act of 1964 as amended to assist in financing an Origin and Destination Survey generally described as:

Logan Airport Travel Study

The applicant represents that the data submitted to The Department of Transportation in support of this application are true and correct.

DANIEL S. HORGAN
Chief Engineer

1. IDENTIFYING DATA

Name and Address of Applicant Agent:	Massachusetts Department of Public Works, 100 Nashua St. Boston, Massachusetts 02114
Applicant's Authorized Representative:	George L. Wey, Director Bureau of Transportation Planning and Development, Massachusetts Department of Public Works, 100 Nashua Street Boston, Massachusetts 02114
Applicant's Consultants:	Qualifications requested from: Audits & Surveys, Inc. 1 Park Avenue New York, New York 10016 Alan M. Voorhees & Associates, Inc. Transportation & Planning Consultants 7670 Old Springhouse Road Westgate Research Park McLean, Virginia 22101 Opinion Research Research Park Princeton, New Jersey 08540 Wilbur Smith & Associates, Inc. 155 Whitney Avenue New Haven, Connecticut 06504

2. LEGAL INFORMATION

Resolution of the Massachusetts Department
of Public Works Board of Commissioner

Be it hereby resolved that the Department through its Chief Engineer and through his agent, the Director of the Bureau of Transportation Planning and Development may enter into an agreement with other agencies of the Commonwealth to perform an Origin and Destination survey called the Logan Airport Travel Study.

This Department will request the Urban Mass Transportation Administration of the U. S. Department of Transportation for a technical studies grant to support the study. Also this Department will engage Planning Consultant firm experienced in such studies to perform the necessary tasks.

An attached draft submitted to UMTA gives all pertinent information.

Resolved May 1969

Attested by

OPINION AND CERTIFICATE OF COUNSEL

ASSURANCE OF COMPLIANCE WITH TITLE VI OF THE CIVIL RIGHTS ACT OF 1964 (DEPARTMENT OF TRANSPORTATION)

Hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P. L. 88–352) and all requirements imposed by the U. S. Department of Transportation, to the end that, in accordance with Title VI of that Act, no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Department of Public Works receives Federal financial assistance from the Department of Transportation under Federal urban mass transportation programs; and hereby gives assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of Federal financial assistance extended to the Department of Public Works by the Department of Transportation under Federal urban mass transportation programs, this assurance shall obligate the Department of Public Works for the period during which the Federal financial assistance is extended to it by the Department of Transportation under Federal urban mass transportation programs.

This assurance is given in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property, discounts or other Federal financial assistance extended after the date hereof to the Department of Public Works by the Department

of Transportation under Federal urban mass transportation programs. The Department of Public Works recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Department of Public Works, its successors, transferees and assignees. The person or persons whose signatures appear below are authorized to sign this assurance on behalf of the Department of Public Works.

Dated_____Massachusetts Department of Public Works

By: EDWARD J. RIBBS
Chairman of Board of Commissioners
100 Nashua Street
Boston, Massachusetts 02114
Mailing Address

3. STATUS OF COMPREHENSIVE PLANNING AND TRANSPORTATION PLANNING

A. Comprehensive Planning

1. *Planning Process*

Comprehensive regional planning for the Boston Metropolitan Area is the responsibility of the Metropolitan Area Planning Council. The MAPC has been actively engaged in long-range comprehensive planning since its establishment in 1963. The major elements in the MAPC's comprehensive planning process include:

- the formulation and continuous evaluation of regional goals, objectives, and policies.
- the collection, analysis, and forecasting of economic, demographic, housing, land use, fiscal, open space, recreation, and community facilities data.
- participation in the preparation of a comprehensive cooperative transportation plan with appropriate State and metropolitan agencies.
- preparation of alternative comprehensive regional development plans including land use, transportation, open space, recreation and community facilities.
- preparation of a short-range and long-range comprehensive regional development plan.
- development of a work program for future Council activities.
- coordination of local and metropolitan plans, programs, and activities affecting regional development.
- functional planning and programming to implement the comprehensive development plan.
- review, revision, and updating of comprehensive development plan.

For the past four and one-half years the MAPC's planning has been primarily through the Eastern Massachusetts Regional Planning Project which has been funded at the State level by the Massachusetts Department of Public Works and the Massachusetts Department of Commerce and Development. The purpose of this project is the development of a comprehensive development plan,

including a transportation plan, for the study regional which embraces 152 cities and towns.

The Planning Project has been directed by a Policy Committee made up of representatives of:

The Massachusetts Department of Commerce and Development.
The Massachusetts Department of Public Works.
The Metropolitan Area Planning Council.
The Massachusetts Bay Transportation Authority.
The Local Advisory Board

and has been financially aided by

The Department of Housing and Urban Development, through Section 701 of the Housing Act of 1954 as amended, under contract with the Department of Commerce and Development, and by

The Eastern Massachusetts Regional Planning Project's "Recommended Highway and Transit Plan" report was accepted by the Project Policy Committee on October 17, 1968.

That report recommends a comprehensive and coordinated highway and transit plan which is aimed at resolving both present and future congestion.

3. *Urban Area Coverage*

The MAPC has member communities including all 78 units of local government making up the Boston SMSA.

4. *Planning Agency*

The MAPC is the official comprehensive planning in August 1963 by Chapter 668 of the Acts of 1963 as amended in 1966.

The MAPC is responsible for the preparation of comprehensive plans for the physical, social, and economic improvement of the Planning District with respect to the optimum use of land and the most efficient provisions for utilities. The MAPC may also approve or disapprove such plans for the development and redevelopment of the Planning District as may be presented to it. The MAPC is also required to maintain full cooperation with cities and towns in the Planning District and to assist them in their planning activities.

The MAPC is supported by an annual contribution from communities in the Planning District in the amount not to exceed five cents per capita of the population in member cities and towns. Funds for

the MAPC are appropriated by the Massachusetts Legislature and charged as an assessment on member communities.

5. *Representation*

a. Each city and town in the Planning District is represented on the Council by one member appointed by the Mayor, city manager, board of selectmen, or town manager, as appropriate.

b. *State*

The Commonwealth of Massachusetts is represented on the Council by 21 persons appointed by the Governor.

c. *Public Agencies*

Public functional agencies are represented on the Council by the following officers or their designees: the Commissioner of the Boston Department of Public Works, the Chairman of the Boston Redevelopment Authority, the Commissioner of the Massachusetts Department of Natural Resources, the Chairman of the Massachusetts Bay Transportation Authority, the Commissioner of the Massachusetts Department of Commerce and Development, the Commissioner of the Massachusetts Department of Public Works, the Chairman of the Massachusetts Port Authority, the Chairman of the Massachusetts Turnpike Authority, and the Commissioner of the Metropolitan District Commission.

6. *Long Range Program Eligibility*

Documentation of the Boston area's elibibility for Federal financial assistance under the provisions of the long-range program of the Urban Mass Transportation Act of 1964 as amended was submitted to the Department of Housing and Urban Development by the Massachusetts Department of Commerce and Development on August 6, 1968 and by the Metropolitan Area Planning Council on August 9, 1968. As a result DOT has advised that the eligibility requirements of the long-range program have been met.

B. Transportation Planning

1. *Planning Process*

The principal source of transportation planning in the Commonwealth of Massachusetts is the Bureau of Transportation Planning and Development of the Department of Public Works. The Bureau is responsible for the continual preparation and coordination of

transportation plans and programs, with said plans and programs to be prepared in coordination with other appropriate governmental agencies. This coordination has been accomplished in Eastern Massachusetts by virtue of the fact the Planning Project is the vehicle by which the Bureau is conducting its transportation planning.

In that project, the participating agencies agreed to formulate a coordinated, comprehensive regional development plan based on the evaluation and analysis of several alternative land use and transportation system plans; the collection, analysis, and projections of traffic, land use, economic and population data; and the evaluation of the interrelationships between land use, economic, and population factors, and transportation facilities.

2. *Status of Planning*

The transportation plan alternatives included in the two regional plans alternatives described above include an integrated highway and transit network for 1975 and two such integrated networks for 1990. The Department of Public Works completed its report on its selected 1990 plan in 1968. All transportation network development and testing has been done jointly by the DPW's Bureau of Transportation Planning and Development and the Massachusetts Bay Transportation Authority.

3. *Urban Area Coverage*

The Department of Public Works urban transportation program covers all the urban areas within the Commonwealth. For Eastern Massachusetts this planning is done by means of the Regional Planning Project in which the urban transportation planning is conducted for the Boston, Brockton, Lowell, and Lawrence-Haverhill SMSA's. The rest of the Commonwealth as well as certain highway planning work in Urban areas is handled in the Statewide Highway Transportation Study of the Bureau of Transportation Planning and Development.

4. *Representation of Local Government*

The units of local government are representated in the transportation planning process in three ways: (a) as member of the MAPC (b) as members of Transportation Coordinating Committees established by agreement with the DPW under the provisions of the Federal-Aid Highway Act of 1962 and (c) in consultation with DPW on specific projects.

5. *Participation of Transportation Agencies and Companies*

a. *Public Agencies*

The principal mass transportation agency is the Massachusetts Bay Transportation Authority itself. It is involved in the comprehensive and transportation planning process by virtue of its membership in the MAPC and its participation in the EMRPP. The other public agencies concerned with transportation are also members of the MAPC. All the transportation operating agencies are associated with the DPW's transportation planning through membership in the Governor's Advisory Council on Transportation which meets periodically at the DPW's Transportation Planning Center.

b. *Private Carriers*

Private mass transportation companies are continually apprised of the transportation planning and its effects on their operations as these plans are developed, primarily by periodic meetings held in the offices of the MBTA.

This constant apprisal of Eastern Massachusetts Street Railway Company of the applicant's plans resulted in the applicant's purchase of the assets of this firm. It is the MBTA's continuing practice to involve all private carriers in those plans affecting their operation.

In the case of the Boston and Maine Railroad, New Haven Railroad, and Middlesex and Boston Street Railway Co., service contracts between the MBTA and those carriers have been executed.

c. *Transit Development Program*

A comprehensive *Program for Mass Transportation* as required by the legislation was completed by the MBTA during August 1966 and submitted to the Advisory Board, who subsequently unanimously approved it on September 15, 1966. The unanimity of the approval resulted both from the applicant's thorough advance review and discussion of the proposals with the Advisory Board and their direct access to the MBTA technical staff and the Council. The Executive Committee of the Council adopted a resolution endorsing the *Program for Mass Transportation* on September 7, 1966.

The approved Program for Mass Transportation represents both

a program for the coordinated and unified operation of the mass transportation system of the entire Boston metropolitan area, and a program for transit capital improvements for the entire metropolitan area for the next five years.

As evidence of the effectiveness of its inter-agency relationships, the applicant in August 1967 received an award from HUD for outstanding contributions to inter-governmental relations.

In February 1968 the *Program for Mass Transportation* was revised and approved by the Advisory Board. The revision provided for the replacement of a high-speed trolley line between Ashmont and Mattapan stations by an extension of the Harvard-Ashmont rapid transit line to Mattapan.

In January of 1969 the MBTA in response to escalating costs and in order to respond to the need for a constant updating submitted a new "Revised Program for Mass Transportation, January 1969".

Lastly, in response to a directive of the Massachusetts Legislature, Chapter 90 of the Acts of 1968, the Massachusetts Bay Transportation Authority in conjunction with the Massachusetts Port Authority prepared a report titled "A Study of Improved High Speed Public Transportation Between Boston-Logan International Airport and Downtown Boston.

The first recommendation in that report follows:

1. That an origin and destination study be made of ground transportation trips between the Airport and all sections of the downtown and of the Metropolitan Boston Air Service Area, including an analysis of the existing use of MBTA services and the attitudes of potential riders towards future improvements and use of public ground transportation services. This study could be undertaken in accordance with an interagency agreement by and between the agencies concerned with improved access to the airport: that is, the Massachusetts Port Authority, the Massachusetts Bay Transportation Authority, the Massachusetts Turnpike Authority and the Massachusetts Department of Public Works.

d. *Maintenance of Transit Development Program*

The law sets the guidelines for the manner in which the Authority should plan for the future. Section 5(g) of Chapter

161A as amended by 563 of the Acts of 1964 states: "The Authority shall prepare and from time to time *revise* its Program for Mass Transportation within the area constituting the Authority. Such program shall be based upon transportation plans and programs adopted by the Public Works Commission."

4. PROJECT DESCRIPTION AND SCOPE

The Department of Public Works through its Bureau of Transportation Planning and Development is spearheading an effort by the Massachusetts Bay Transportation Authority and the Massachusetts Port Authority to determine the pattern of travel to and from the Airport.

A sample of all employees, visitors and air travellers entering and leaving Logan is to be interviewed regarding their ground and air travel.

The sample shall amount to approximately 15% of all persons traveling into or out of Logan on an average day. It shall be expanded to reflect the full universe of travel into and out of Logan for an average day of the month.

Objective and Scope

The results of this survey will be used to study the feasibility of a rapid transit link from downtown Boston to the airport. In addition the results will be used by this Department and other State agencies to analyze airport needs.

The objective of this survey is to produce statistically valid information for trips originating at and destined to the Logan Airport. Secondarily, if it is economically feasible, an attitudinal study of a small sample of airport trip makers is desired.

The survey design should be presented with this attitudinal survey as an option which may be included in the final contract if the Department so desires.

The trip information must be coded to the Eastern Massachusetts Regional Planning Project Zonal System. External areas must be coded as defined in the External Zoning System Manual. (Information Bulletin 3 of the Bureau of Transportation Planning and Development).

Other Data items to be gathered are:

a. Trip* Purpose (Work, Personal Business, Serve Passenger, etc.)
b. Access/egress modes
c. Access/egress time and cost
d. Travel party size
e. Annual Family Income of Traveler
f. Place of residence (coded geographically as indicated).
g. Trip Origin address (coded geographically as indicated).
h. Trip Destination address (coded geographically as indicated).
i. Time of beginning and time of ending of trip
j. Where parked
k. Time at airport

The sampling plan shall be designed to be a probability sample covering the period from September 1, 1969 to September 30, 1969, or a like period. It is essential that the sampling plan be developed with sufficient specificity regarding survey sites far enough in advance of implementation to allow adequate time for coordination with carriers, highway officials, airport officials and other affected persons and organizations.

Scope of Work

The contractor shall furnish all necessary qualified personnel, facilities, materials and such other services as may be required to conduct successfully the "Logan Airport Travel Survey" in accordance with the objectives listed above and as further specified herein. All contacts with transportation companies and government officials must be made through the Department or be authorized by the Department. The work to be performed shall be divided into three phases as follows:

Phase I – Survey Design
Phase II – Data Collection
Phase III – Data Processing

Upon completion of Phase I – Survey Design, the Contractor shall submit a report to the Department for review and evaluation as to the feasibility of initiating Phase II and III under the contract. Since

*Trip means surface travel to or from airport; distant origin or destination City of air traveler is also wanted.

this document is to provide the basis for obtaining cooperation from the carriers and government officials in conducting the survey, the material shall be presented in easily understood and straightforward writing. Highly technical or very detailed materials shall be organized into appendices. No work shall begin on Phase II – Data Collection, until review and coordination has been completed and authorization in writing has been received from the Director of the Bureau of Transportation Planning and Development.

5. PROJECT BUDGET AND SOURCES OF FUNDS

Project Budget and Sources of Funds
Logan Airport Travel Study

Awaiting Proposal from Consultant –
see attached Request For Proposal
for further details.

Sources of Local Shares

The Local One Third Share of $20,000 will be met through cost and services. See attached agreement derived from the following agencies in the amounts cited:

Agency	Cash Amount	Services Amount	Tentative
Massachusetts Department of Public Works	$ 4,500	$ 500	$ 7,500
Massachusetts Port Authority	5,000	––	1,500
Massachusetts Bay Transportation Authority	5,000	––	1,500
Massachusetts Turnpike Authority	––	1,250	1,500
City of Boston	––	3,750	3,750
	$14,500	$5,500	$15,750
			14,500
Total	$20,000		$30,250

6. ABILITY TO CARRY OUT STUDY

Department Staff

The Technical Study for which Federal Aid is being sought will be under the general supervision of a Project Monitor in the Bureau of Transportation Planning and and Development who will spend part time supervising this project.

During the Logan Airport Travel Study the Project Manager will receive his chief Technical Staff support from members of Said Bureau as well as from Technical Staff of the contributing agencies.

The professional resume of the Project Manager is attached.

Technical Consultant

The majority of the technical work to be carried out under the proposed study will be by a consultant. The Department does not have sufficient manpower with the necessary skills to permit conducting this study primarily with its own staff.

Four consultants have been contacted for their qualifications and after a review by the Department's Architects and Engineers Review Board, a consultant will be selected and the request for proposal submitted to him.

The consultants who were asked to submit qualifications are:

Audits & Surveys, Inc.
1 Park Avenue
New York, New York 10016
Alan M. Voorhees & Associates, Inc.
Transportation & Planning Consultants
7670 Old Springhouse Road
Westgate Research Park
McLean, Virginia 22101
Opinion Research

Research Park
Princeton, New Jersey 08540
Wilbur Smith & Associates, Inc.
155 Whitney Avenue
New Haven, Connecticut 06504

Statements on Consultants

The work to be contracted has not previously been done by any member of the Department's staff or consultants.

B. Neither the staff nor consultants are working on a study which duplicates in any way the work now being requested. In the CASS Study, there is a feasibility study for a transit spur track from the vicinity of the present Airport Station to the Logan Airport Terminal Area. This study is based on past surveys which may be adequate for such an examination but aren't sufficient for the consideration of a new rapid transit link from Downtown to the airport.

C. Certain previous studies which have a bearing on the present Logan Airport Travel Study will be used for background information, primarily:

1. CASS Study (Underway) MBTA
2. A Study of Improved High Speed Public Transportation between Logan International Airport and Downtown Boston – MBTA and Mass. Port Authority.
3. EMRPP Recommended Highway and Transit Plan – Mass. DPW.

ATTACHMENT A

Request for Proposal

Subject: Request for Proposal Entitled: "Logan Airport Travel Survey"

Gentlemen:

Please be advised you have been selected to submit a proposal to perform an Origin-Destination Survey at Logan Airport.

The Department of Public Works, through its Bureau of Transportation Planning and Development, is spearheading an effort by the Massachusetts Bay Transportation Authority and the Massachusetts Port Authority to determine the pattern of travel to and from the Airport.

A sample of all employees, visitors and air travellers entering and leaving Logan is to be interviewed regarding their ground and air travel.

The sample shall amount to approximately 15% of all persons travelling into or out of Logan on an average day. It shall be expanded to reflect the full universe of travel into and out of Logan for an average day of the month.

Objective

The results of this survey will be used to study the feasibility of a rapid transit link from downtown Boston to the Airport. In addition, the results will be used by this Department and other State agencies to analyze airport needs.

The objective of this survey is to produce statistically valid information for trips originating at and destined to Logan Airport.

Secondarily, if it is economically feasible, an attitudinal study of a small sample of airport trip makers is desired.

The survey design should be presented with this attitudinal survey as an option which may be included in the final contract if the Department so desires.

The trip information must be coded to the Eastern Massachusetts Regional Planning Project Zonal System. External areas must be coded as defined in the External Zoning System Manual (Information Bulletin No. 3 of the Bureau of Transportation Planning and Development). Other data items to be gathered are:

a. Trip* purpose (work, personal business, service passenger, etc.)
b. Access/egress modes
c. Access/egress time and cost
d. Travel party size
e. Annual family income of traveller
f. Place of residence (coded geographically as indicated)
g. Trip origin address (coded geographically as indicated)
h. Trip destination address (coded geographically as indicated)
i. Time of beginning and time of ending of trip
j. Where parked
k. Time at airport

The sampling plan shall be designed to be a probability sample covering the period from September 1, 1969 to September 30, 1969, or a like period. It is essential that the sampling plan be developed with sufficient specificity regarding survey sites far enough in advance of implementation to allow adequate time for coordination with carriers, highway officials, airport officials and other affected persons and organizations.

Scope of Work

The contractor shall furnish all necessary qualified personnel, facilities, materials and such other services as may be required to conduct successfully the "Logan Airport travel Survey" in accordance with the objectives listed above and as further specified herein. All contracts with transportation companies and government officials

*Trip means surface travel to or from airport; distant origin or destination city of air traveler is also wanted.

must be made through the Department or be authorized by the Department.

The work to be performed shall be divided into three (3) phases as follows:

Phase I – Survey Design
Phase II – Data Collection
Phase III – Data Processing

Upon completion of Phase I, Survey Design, the contractor shall submit a report to the Department for review and evaluation as to the feasibility of initiating Phase II and III under the contract. Since this document is to provide the basis for obtaining cooperation from the carriers and government officials in conducting the survey, the material shall be presented in easily understood and straightforward writing. Highly technical or very detailed materials shall be organized into appendices. No work shall begin on Phase II, Data Collection, until review and coordination has been completed and authorization, in writing, has been received from the Director of the Bureau of Transportation Planning and Development.

Phase I – Survey Design

To implement the stated objectives, the contractor shall, as a minimum, perform the following tasks (the listing of tasks is not intended to prescribe sequence or allow omission of other items considered good practice in the field of transportation planning):

Task 1

Develop a detailed probability type sampling plan structured to assure proper response from each of the major trip making groups: airport workers, visitors and air travellers. To insure that the sampling plan will permit a reliable expansion of the sample data to the total universe of travel, the contractor shall develop a detailed plan for obtaining and using ancillary data required for this verification purpose.

If alternative sampling procedures are proposed, the contractor should provide information on relative time, cost and levels of reliability for each alternative. The contractor shall establish accept-

able deviation limits and confidence levels for a statistically sound sampling rate and upon completion show reliability.

The survey plan shall also include the development of record-keeping forms and procedures that will be required to provide an accurate and systematic record of survey conduct and important matters. The survey design should be presented with all unit costs shown in such a manner that the Department can determine the marginal costs which would be incurred in obtaining additional information.

Task 2

Design questionnaire or interview forms as appropriate for each survey segment and mode. The questionnaire may be self-administered but not necessarily so.

Task 3

Run a pilot survey and pretest questionnaires, sampling plan and field work procedures for each mode. Document and analyze the results and recommend modifications or improvements if necessary. 80 Broad Street, Boston, Massachusetts (see Article V of Standard Provisions for Contract Services for Transportation Planning and Research attached).

No materials or copies of data will be kept by the consultant without specific written authorization from the Department in response to a request for a specific use.

Task 4

Prepare field work procedural manuals for survey crew training and instruction and all necessary field record forms required for orderly and efficient data collection operations. These manuals should be specific.

Task 5

Prepare a data processing plan describing, in detail, all procedures and materials that will be used in editing, coding, developing expansion factors and preparing punch card (if necessary) and magnetic tape files of the trip records required for this project. All data files and computer programs shall be compatible with the IBM 360 System, as developed by the Bureau of Public Roads. The full data handling and processing plan shall be diagrammed as the example shown in Appendix A, with every step numbered with all unit record layouts included as well. This work task shall also include but not be limited to the following:

a. Preparation of instruction manuals for performing, editing, coding and keypunching, with lists of reference materials to be used. (There is available a 1963-1964 Wilbur Smith Geographic Code Index for EMRPP Area).
b. Description of quality control procedures to be used in preparing the data files.
c. Specification of statistical estimation procedures, formulae and computer programs to be used.
d. Preparation of four (4) copies each of basic tabulations of both the sample data and the expanded data. These tabulations shall include but not be limited to the following:
    1. Zone of Origin and Destination for all airport trips by all modes.
    2. Zone of Origin and Destination for all airport trips by transit mode (bus and rail).
    3. Zone of Origin and Destination for all airport trips of highway mode (taxi, limousine, private auto and truck).
    4. Zone of Origin and Destination for airport workers by all modes.
    5. Zone of Origin and Destination for airport workers by transit mode.
    6. Zone of Origin and Destination for airport workers by highway mode.
    7. Zone of Origin and Destination for airport visitors (same as workers, #4).
    8. (Same as #5) but visitors.
    9. (Same as #6) but visitors.
    10. Zone of Origin and Destination for air travellers (same as workers, #4, #5, #6).
    11. (Same as #5) but travellers.
    12. (Same as #6) but travellers.
    13. Zone of Origin and Destination for all airport trip makers by trip purpose.
    14. Zone of Origin and Destination for all airport trip makers by trip purpose and mode.
    15. Zone of Origin and Destination for all airport trip makers by income class.
    16. Zone of Origin and Destination for air travellers by income class.

17. Zone of Origin and Destination for all airport trip makers by income class and mode.
18. Zone of Origin and Destination of air travellers by income and class mode.
19. Zone of Origin and Destination of airport workers by income class and mode.
20. Zone of Origin and Destination of airport visitors by income class and mode.*
21. Summary numbers and percentage distribution of access modes used by all airport trip makers.
22. Summary number and percentage distribution of access modes used by deplaning air travellers.
23. Summary number and percentage distribution of access modes used by enplaning air travellers.
24. Summary number and percentage distribution of access modes used by airport visitors.
25. Summary number and percentage distribution of access modes used by airport workers.
26. Summary Tables by time of day.
27. Summary Tables by cost of trip.

Task 6

Prepare a report describing the data collection plan recommended. The Appendix shall include the field work survey manuals and detailed and technical materials. The contractor shall be prepared to describe and discuss the data collection plan with the cooperating carriers, airport officials and the Department. After review and approval of the data collection plan report, the contractor shall incorporate any changes requested by the Department and prepare a revised report. At this time, the contractor will review his cost proposal for Phases II and III and inform the Director of the Bureau of Transportation Planning and Development if any changes are required.

Task 7

Prepare a listing of all certificated airline routes from and to Logan and show the volume on these during the survey period and on a current annual basis.

NOTE: Tabulations 1 through 20 must also be prepared on a community basis.

Task 8

(Optional) Prepare an attitudinal survey to ascertain preferences of different trip makers for transit, auto or other access modes. Find out how attitudes change with income, car ownership and availability of transit. Find out what standard of transit service would be attractive to non-users of transit.

Phase II – Survey

The conduct of Phase II will be contingent on the successful completion of Phase I, and at the time, a detailed work statement for Phase II will be submitted.

Task 1

Implement the approved Data Collection Plan.

Task 2

Prepare a diary of significant events occurring during the conduct of the survey. Provision should be made on the record-keeping forms to document any deviations from planned sampling and survey methods. Any unusual or unexpected events, such as accidents, refusals by respondents to answer questions, refusals to permit questionnaires on board common carrier vehicles or any other happening that affect the survey, should be recorded with all relevant information, such as time, place, vehicle number, etc. Survey supervisors shall be instructed to record any corrective action taken to conform to approved procedures.

Phase III – Data Processing

Task 1

Implement the approved Data Processing Plan.

Task 2

Prepare a report on the conduct of Phase II and Phase III work describing changes or revisions to the survey and the data processing plans. The report should include a discussion of problems that arose and how they were solved. Sampling and estimating methods should be described for each survey segment. Also included should be recommendations for keeping the data current or updating at future intervals.

Task 3

All materials developed in the study, including reports, tabulations, computer tapes (those with final trip tables and edited survey

data), punched cards, survey forms, etc. . . will be forwarded to the Department of Public Works' Transportation Planning Center (at no cost to the Department).

ATTACHMENT B

Logan Airport Travel Study
INTER – AGENCY AGREEMENT

This agreement made this day of 1969, by and between the Department of Public Works ("DPW"), of the Commonwealth of Massachusetts ("Commonwealth"), the Massachusetts Port Authority ("MPA"), the Massachusetts Bay Transportation Authority ("MBTA"), the Massachusetts Turnpike Authority ("MTA") and the City of Boston, being hereinafter collectively referred to as the "Agencies."

Whereas, each of the Agencies is concerned with, and desires to participate in, a study of the origins and destinations of all users, visitors and employees of the Logan International Airport; and,

Whereas, it is the intent of the Agencies that such a study be conducted in a manner to be of maximum benefit to all the Agencies; and,

Whereas, it is agreed that it is in the interest of each of the Agencies and in the public interest that such study and plan be coordinated and undertaken in an integrated and cooperative manner; and,

Whereas, each of the Agencies is willing to participate to the extent hereinafter specified in such study,

Now, therefore, it is hereby agreed by and between the parties hereto as follows:

1. Each of the Agencies shall make a contribution to the DPW for the purpose of making this study in the form of cash or service equal to the amount set opposite its name respectively:

Agency	Cash Amount	Service Amount
Department of Public Works	$4500	$7500
Massachusetts Port Authority	5000	1500
Massachusetts Bay Transportation Authority	5000	1500
Massachusetts Turnpike Authority		1500
City of Boston		3750
		$15,750

It is understood and agreed that no Agency shall, without its consent, be liable for more than the amount of its respective contribution hereinabove indicated. An agency may make or agree to make a contribution in cash or services in excess of the amount hereinbefore, set opposite its name, in which event, such increased amount shall thereafter be deemed to be the amount of its contribution for all purposes hereunder.

2. The Agencies, *individually and collectively*, hereby authorize the DPW to seek Federal assistance for the study from the Department of Transportation to the maximum extent possible.

3. Each Agency, upon request of the Director of the Bureau of Transportation Planning and Development of the DPW, shall supply promptly such data, documentation or other material as may be required for the purpose of applying for and/or administering such Federal assistance.

4. The study, which shall be called the "Logan Airport Travel Study," shall be initiated immediately upon execution of this Agreement, and shall be conducted and completed in accordance with the study specifications, marked Exhibits A – all of which are attached hereto and made a part hereof.

Agencies agree to make such disbursements of their agreed compensation as the Study Director shall require in accordance with the plans and purposes of this Agreement.

5. The Director of the Bureau of Transportation Planning and Development shall act as or shall appoint the Study Director, who shall be responsible for the technical and administrative coordination of the overall study.

It shall also be the responsibility of the Study Director to assure appropriate coordination by the Agencies and any consultants to facilitate the exchange of data between the Agencies and any

consultants, and to carry out the DPW's responsibilities under the study.

The collection of data required for each portion of the study shall be the responsibility of the Agency or consultant conducting such portion, but the Study Director shall assist wherever possible in collecting data from other public or private agencies.

6. Each Agency shall designate a member of its staff as the person primarily responsible for carrying out its responsibilities under the study and shall notify the Study Director of such designation promptly in writing.

7. Such consultants, as may be necessary to assist an Agency in performing its obligations under this Agreement, shall be selected by each such Agency, subject to the approval of the Governor's Advisory Council on Transportation ("Council").

A. Consultant contracts shall contain such terms and conditions as are required by the Department of Transportation, should Federal financial assistance be forthcoming.

8. The Agencies shall consult with the Governor's Advisory Council on Transportation and may incorporate in the final report any suggestions of said Council.

9. This Agreement shall be effective upon the execution hereof by the Agencies agreeing to make the contributions hereinbefore indicated. If, for any reason, any of the Agencies fail to become parties hereto, this Agreement shall nevertheless become and remain effective in accordance with all its terms, except that the party or parties not executing the agreement shall not be considered as contributors, and the aggregate amount, under Paragraph I above, may be correspondingly reduced.

10. Each of the Agencies represents and agrees that it has funds appropriated, authorized and/or available to make payments of its contribution thereunder.

11. This Agreement may be executed in any number of counterparts, each of which shall be deemed to be an original.

12. This Agreement shall be binding upon and insure to the benefit of each of the Agencies and its successors.

In witness whereof, each of the Agencies has caused this Agreement to be executed on its behalf by its thereunto duly authorized officer or representative as of the day and year first above written.

DEPARTMENT OF PUBLIC WORKS
COMMONWEALTH OF MASSACHUSETTS

BY

MASSACHUSETTS PORT AUTHORITY

BY

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BY

MASSACHUSETTS TURNPIKE AUTHORITY

BY

CITY OF BOSTON

BY

T10
M3 Massachusetts, Commonwealth of
Special Report of the MBTA & MPA Relative to the Feasibility of Operating High Speed Trans. System.
DATE | ISSUED TO